

AMENDMENTS TO THE CLAIMS

1. (Currently amended) A custom-fit mouthguard to protect teeth in an arch of a user comprising:

an outer wall covering a buccal surface of teeth in the arch of the user, wherein said outer wall includes a force absorbing inner layer, a force absorbing outer layer, and a force transmitting layer positioned therebetween a portion of said force absorbing inner layer and a portion of said force absorbing outer layer, and said force transmitting layer is a generally planar rectangular strip of a dental grade material having a plurality of longitudinally extending fibers bonded together and said force absorbing inner layer or force absorbing outer layer is a dental grade material that is resilient, moldable and settable;

wherein the arch of the user includes a right side and a left side, and said force transmitting layer only extends between a first molar on the right side of the arch of the user and a first molar on the left side of the arch of the user, and only covers an incisal to a cervical portion of each tooth between the first molar on the right side of the arch and the first molar on the left side of the arch;

an inner wall opposite said outer wall covering a palatal surface of teeth in the arch of the user, wherein said inner wall only includes said force absorbing inner layer and said force absorbing outer layer; and

a lower wall connecting said outer wall with said inner wall and covering an occlusal surface of teeth in the arch of the user, wherein said lower wall only includes said force absorbing inner layer and said force absorbing outer layer and said outer wall, inner wall and

lower wall form a U-shaped channel that is molded in the shape of the arch of the user, and a force applied to the arch is absorbed by the force absorbing outer layer of the outer wall and distributed along the longitudinally extending fibers in the force transmitting layer of the outer wall adjacent only the buccal surface of the teeth, to reduce the applied force before the applied force is transmitted through the arch of the user.

2. (Previously presented) A mouthguard as set forth in claim 1 wherein said force transmitting layer includes of a plurality of longitudinally extending fibers disposed in a resinous matrix wherein each fiber has a length corresponding to a length of the rectangular strip, to distribute a shear force over the length of the fibers.

3. (Original) A mouthguard as set forth in claim 1 further comprising a palate protective wall extending radially from an edge of said inner wall, wherein said palate protective wall conforms to a shape of a palate of the user.

4. (Previously presented) A mouthguard as set forth in claim 1 wherein said force absorbing inner layer and said force absorbing outer layer are made from a class of thermoplastic materials approved for dental use having resilient, moldable, and settable properties.

5. (Original) A mouthguard as set forth in claim 4 wherein said force absorbing inner layer includes a chemical additive enabling the material to be rigid below a first predetermined temperature and moldable above a second predetermined temperature that is greater than the first predetermined temperature.

6. (Original) A mouthguard as set forth in claim 4 wherein said force absorbing inner layer material includes a gas-liberating chemical additive that is selected from a class of additives that is chemically reactive upon the application of heat to liberate air bubbles that become trapped in the force absorbing inner layer material.

7. (Canceled)

8. (Previously presented) A mouthguard as set forth in claim 1 wherein said composite force transmitting material includes a plurality of long fibers embedded in a resin matrix.

9. (Original) A mouthguard as set forth in claim 8 wherein said fibers are selected from a class of material that includes glass fibers, or carbon fibers or quartz fibers.

10. (Original) A mouthguard as set forth in claim 8 wherein said resin matrix is selected from a class of resinous materials including an epoxy resin, or a polyester resin or an acrylic resin.

11. (Previously presented) A mouthguard as set forth in claim 1 wherein said force transmitting layer is preformed as a strip.

12. (Canceled)

13. (Currently amended) A custom-fit mouthguard to protect teeth in an arch of a user comprising:

an outer wall covering a buccal surface of teeth in the arch of the user, wherein said outer wall includes a force absorbing inner layer and a force absorbing outer layer that are each made from a class of materials approved for dental use having resilient, moldable, and settable properties, and a force transmitting layer positioned therebetween a portion of said force absorbing inner layer and a portion of said force absorbing outer layer, wherein said force transmitting layer is a preformed rectangular strip of a dental grade material having a plurality of longitudinally extending fibers disposed in a resinous matrix and each fiber has a length corresponding to a length of the rectangular strip and said force absorbing inner layer or force absorbing outer layer is a dental grade material that is resilient, moldable and settable;

wherein the arch of the user includes a right side and a left side, and said force transmitting layer only extends between a first molar on the right side of the arch of the user and a first molar on the left side of the arch of the user, and only covers an incisal to a cervical portion of each tooth between the first molar on the right side of the arch and the first molar on the left side of the arch;

an inner wall opposite said outer wall covering a palatal surface of teeth in the arch of the user, wherein said inner wall only includes said force absorbing inner layer and said force absorbing outer layer; and

a lower wall connecting said outer wall with said inner wall and covering an occlusal surface of the teeth, wherein said lower wall only includes said force absorbing inner layer and said force absorbing outer layer and said outer wall, inner wall and lower wall form a U-shaped

channel that is molded in the shape of the arch, and a force applied to the arch is absorbed by the force absorbing outer layer of the outer wall and distributed along the longitudinally extending fibers in the force transmitting layer of the outer wall adjacent only the buccal surface of the teeth, to reduce the applied force before the applied force is transmitted through the arch of the user.

14. (Original) A mouthguard as set forth in claim 13 further comprising a palate protective wall extending radially from an edge of said inner wall, wherein said palate protective wall conforms to a shape of a palate of the user.

15. (Original) A mouthguard as set forth in claim 13 wherein said force absorbing inner layer includes a chemical additive enabling the material to be rigid below a first predetermined temperature and moldable above a second predetermined temperature that is greater than the first predetermined temperature.

16. (Original) A mouthguard as set forth in claim 13 wherein said force absorbing inner layer material includes a gas-liberating chemical additive that is selected from a class of additives that is chemically reactive upon the application of heat to liberate air bubbles that become trapped in the force absorbing inner layer material.

17. (Original) A mouthguard as set forth in claim 13 wherein said fibers are selected from a class of fibrous material includes glass fibers, or carbon fibers or quartz fibers.

18. (Original) A mouthguard as set forth in claim 13 wherein said resin matrix is selected from a class of resinous materials including an epoxy resin, or a polyester resin or an acrylic resin.

19. (Canceled)

20. (Canceled)

21. (Withdrawn) A method of making a mouthguard for a user, said method including the steps of:

casting a model of a user's arch;

molding a force absorbing inner layer of material to the model to form a force absorbing inner layer of the mouthguard;

molding a force-transmitting layer of material over the force absorbing inner layer in a predetermined position, wherein the force transmitting layer includes a plurality of longitudinally extending fibers disposed in a resinous matrix;

molding a force absorbing outer layer of material over the force absorbing inner layer and force transmitting layer to form a mouthguard having an inner wall covering a palatal surface of a tooth, an outer wall opposite inner wall covering a buccal surface of the tooth and a lower wall disposed therebetween the inner wall and outer wall covering an occlusal surface of the tooth; and

finishing the mouthguard to conform to the arch of the user.

22. (Withdrawn) A method as set forth in claim 21 further comprising the step of using a sizing device to determine the size of mouthguard to use, wherein said sizing device includes a u-shaped bite member having a handle extending from an edge, and a plurality of arch shapes indicated on a surface of the bite member corresponding to a mouthguard size.

23. (Withdrawn) A mouthguard as set forth in claim 21 wherein said fibers are selected from a class of fibrous material including glass fibers, or carbon fibers or quartz fibers.

24. (Withdrawn) A mouthguard as set forth in claim 21 wherein said resin matrix is selected from a class of resinous materials including an epoxy resin, or a polyester resin or an acrylic resin.

25-26 (Canceled)